

SOME AQUATIC HEMIPTERA HAVING ONLY FOUR NYMPHAL STAGES.

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During the past year while doing some rearing work in connection with the evaluation of certain aquatic environments three species of waterbugs were found to possess but four nymphal stages instead of five which is the usual number among aquatic Hemiptera. Mr. Bueno in his paper on *Microvelia borealis* Bueno, published in 1917, stated this species to have but four nymphal stages. Hungerford in rearing this species found more than this in some and it was suggested that here might exist variation or that apterous forms have fewer stages than winged. I have not reared the winged form of this species but I have secured the length of the last nymphal stage of the winged form of *M. hinei* Drake, *M. albonotata* Champion and *M. buenoi* Drake, and in each case the duration was the same as for the apterous forms of the same species. This coupled with the fact that the winged and apterous forms of a *Velia* I have reared not only have the same number of instars but have instars of equal duration, leads me to believe that both forms of *M. borealis* will be found to have the same number of nymphal stages.

I am convinced Dr. Hungerford reared *Microvelia hinei* Drake rather than *M. borealis*. Plate XII of his "The Biology and Ecology of Aquatic and Semiaquatic Hemiptera" is rather confusing in light of what he has to say on page 139. He there states he has "found more than four nymphal stages in some," referring no doubt to the winged form, yet he figured only four nymphs on his plate. His figure 8, of "last instar nymph," is a figure of the apterous form of *M. hinei*. The apterous form of this species has always had five stages in my experience. Several dozen nymphs have been reared under varying conditions of temperature (including rearings of 70° and 90° F. constant temperature) and nutrition, yet the number of instars has been constant. At the present time I have this species in rearing and hope to breed out winged forms.

So far as known to the writer *Microvelia borealis* Bueno is the only waterbug recorded as having less than five nymphal stages. I reared this species the past season obtaining the same result that Mr. Bueno recorded. The only other species of *Microvelia* that has been reared in this country is *M. americana* (Uhler). I

have reared this species the past two seasons securing data not unlike that published by Bueno in 1910. In addition to this I have secured the life histories of *M. hinei* Drake, *M. albonotata* Champion and *M. buenoi* Drake, finding the first two species to have five nymphal stages and the last named but four. So of the *Microvelia* whose life cycles we know, we have three species with five nymphal stages, and two species with four nymphal stages.

The other aquatic Hemipteron found to have but four nymphal stages is *Nepa apiculata* Uhler. This is as interesting as the case of the *Microvelia*, for since the European *N. cinerea* L. is said to have five nymphal stages, we again have species within the same genus, with a different number of instars. For other genera Bueno has found *Ranatra americana* Montandon to have five nymphal stages while the speaker has found the same to hold for two other species of *Ranatra* including one undescribed species. Both Mrs. Grace Wiley and myself have reared an undescribed species of *Curicta* which possesses five nymphal stages.

LIFE HISTORY RESULTS.

	egg stage	first instar	second instar	third instar	fourth instar	total nymphal period	sex	date
	days	days	days	days	days	days		
M. borealis ..	18	8	5	5	9	27	♀	Nov. 6
	18	7	6	3	6	22	♀	Oct. 24
	18	7	5	5	8	25	♂	Oct. 31
M. buenoi	12	7	7	7	6	27	♀	Oct. 28
	12	8	6	6	7	27	♀	Oct. 30
	12	7	6	5	8	26	♀	Nov. 1
	12	8	6	9	14	37	♀	Nov. 16
	10	10	6	7	8	31	♂	Oct. 10
N. apiculata .	16	9	9	13	23	54	♀	Sep. 28
	16	8	11	12	24	55	♀	Sep. 28
	9½	10	9	14	18	51	♂	Oct. 14

It may be observed from the above results that the nymphal life averaged $24 \frac{2}{3}$ days for three specimens of *Microvelia borealis* Bueno, $29 \frac{3}{5}$ days for five specimens of *Microvelia buenoi* Drake, and $53 \frac{1}{3}$ days for three specimens of *Nepa apiculata* Uhler. Additional data from incomplete life histories might have been used in securing the average length of the several instars, but inasmuch as temperature plays such an important rôle in the development of these forms, the rate of development at unknown temperatures is not extremely valuable. Rearings under controlled temperatures are now in progress and will be reported on at a later date.